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POSITIONING METHOD, APPARATUS AND A PRODUCT THEREOF METHOD FOR
LASER MICROMACHINING

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1-28. (CANCELED)

29. (PREVIOUSLY PRESENTED) A method of laser micro-machining a work piece with a laser, the method comprising by the steps of:

locating the workpiece on a carrier forming a part of a transport system whereby the carrier can be displaced along a path parallel to an X-axis of the workpiece, a Y-axis lying transverse the path, and a Z-axis lying transverse the path;

focusing an image generated by an output beam from the laser, at a working datum position defined relative to the path, the path is established by the transport system to traverse the first datum position;

defining a plane by the X- and Y-axis lying substantially perpendicular to the output beam;

displacing the workpiece along the path by way of the transport system so as to enable the work piece to be subject to micro-machining by way of the laser;

maintaining a distance between the datum position and a current first surface position of the work piece in a vicinity of the of the datum position; and

varying the working datum position to accord with local variations in thickness of the work piece so that the working datum position is maintained at a fixed distance relative to a surface of the work piece; and

sensing undertaken by way of a distance sensing device comprising a body member riding on a fluid cushion on a first surface of the work piece, the fluid cushion being established by a flow of fluid fed from the body member so as to maintain the body member at a predetermined distance from first surface; so that in the event the body member is displaced from a current position of the body member due to a variation in thickness of the work piece, any change in position of the body member perpendicular to the first surface is used to modify position of the lens to cause a corresponding change in the current datum position to restore the working datum position to a fixed distance relative to the first surface of the work piece.

30. (PREVIOUSLY PRESENTED) The method as claimed in claim 29, further comprising the step of providing a further body member located relative to a second side of the work piece on the opposite side of the work piece to the body

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member, the further body member servings to urge the work piece towards the body member when a local thickness of the work piece is reduced.

31. (PREVIOUSLY PRESENTED) The method as claimed in claim 29, further comprising the step of varying the working datum position by displacing one of the focusing or imaging lens relative to the work piece.

32. (PREVIOUSLY PRESENTED) The method as claimed in claim 29, further comprising the step of varying the working datum position by displacing the work piece relative to the focusing or imaging lens.

33. (PREVIOUSLY PRESENTED) The method as claimed in claim 29, further comprising the step of providing for the work piece on the carrier for the plane of the work piece, defined by the X-axis and the Y-axis, to be one of vertical or at some other angle to the horizontal.

34. (PREVIOUSLY PRESENTED) An apparatus for laser micro-machining a work piece by a laser, the apparatus comprising:

- a carrier forming a part of a transport system whereby the carrier can be displaced along a path parallel to an X-axis of the work piece, a Y-axis lying transverse the path, and a Z-axis lying transverse the path;

- a means whereby an output beam from a laser can be one of focused or imaged at a predetermined working datum defined relative to the path which path is established by means of the transport system to traverse the first datum position;

- a plane defined by the X- and Y-axis lying substantially perpendicular to the output beam;

- a drive means for causing the work piece to be displaced along the path by way of the transport system so as to enable the work piece to be subject at the datum position to micro-machining by way of the laser, by following a process of:

- maintaining means for regulating distance between a current working datum position and a current first surface position of the work piece in the vicinity of the datum position;

- focusing adjusting means, enabling the working datum position to accord with local variations in thickness of the work piece so that the working datum

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position is maintained at a fixed distance relative to a surface of the work piece and providing a carrier and transport system enabling the work piece to be displaced along the path with the plane of the work piece defined by the X-axis and the Y-axis either vertical or at some other angle to the horizontal, and

a distance sensing device comprising a body member riding on a fluid cushion on a first surface of the work piece, the fluid cushion being established by a flow of fluid fed from the body member so as to maintain the body member at a predetermined distance from first surface; and in the event the body member is displaced from a current position of the body member due to a variation in thickness of the work piece, any change in position of the body member perpendicular to the first surface is used to modify the focusing or imaging forming step to cause a corresponding change in the current datum position to restore the working datum position to a fixed distance relative to the first surface of the work piece.

35. (PREVIOUSLY PRESENTED) The apparatus claimed in claim 34, wherein the body member is located relative to a first side of the work piece and a further fluid emitting body member is located relative to a second side of the work piece on the opposite side of the work piece and fluid output from the further body member serves to urge the work piece towards the body member when a local thickness of the work piece is reduced.

36. (PREVIOUSLY PRESENTED) The apparatus claimed in claim 34, wherein the means for focus adjusting serves to displace one of the focusing or imaging lens relative to the work piece.

37. (PREVIOUSLY PRESENTED) The apparatus claimed in claim 34, wherein the maintaining means serves to displace the work piece relative to one of the focused beam or image.

38. (PREVIOUSLY PRESENTED) The apparatus as claimed in claim 34, including means to providing for the plane of the work piece, defined by the X-axis and the Y-axis, relative to the carrier to be set vertical or at some other angle to the horizontal.

39. (CANCELED)

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